EPA/ESD/R03-90/502
1990

EPA Superfund
Explanation of Significant Differences:

U.S. TITANIUM
EPA ID: VAD980705404
OU 01
PINEY RIVER, VA
09/26/1990

Explanation of Significant Differences
U.S. Titanium Site
Nelson County, Virginia

Contents

Explanation of Significant Differences
U.S. Titanium Site
Nelson County, Virginia

I. Introduction

The U.S. Titanium Site is located in west central Virginia approximately 40 miles south of Charlottesville at the southern border of Nelson County. The site is bordered by Route 151 to the west and the Piney River to the south. The Virginia Department of Waste Management (VDWN) served as the Lead Agency in conducting oversight of the Potentially Responsible Party's (PRP's) performance during the Remedial Investigation and Feasibility Study (RI/FS). The U.S. Environmental Protection Agency (EPA), Region III, has served as the Support Agency for RI/FS oversight activities.

During negotiations with the PRP, review of additional information resulted in a potential change to the method of dissolving the copperas (ferrous sulfate) buried at the site as well as changes to the requirements that must be met in order to discharge treated ground water to the Piney River. Since these changes are considered significantly different from the requirements described in the Record of Decision (ROD) dated November 21, 1989, Section 117(c) of CERCLA requires that an Explanation of Significant Differences (ESD) be issued. This ESD is now a part of the administrative record for the site and is available to the public at the Nelson County Administration Office.

II. Summary of Site History, Contamination Problems, and Selected Remedy

Between 1931 and 1941, titanium dioxide was produced at the site from ilmenite ore using a sulfate process. The ore was obtained from mining operations directly south of the Piney River, then transported across the river to a manufacturing plant where it was treated with sulfuric acid to dissolve the titanium dioxide product. Waste streams from this process included unreacted ore contaminated with acid, spent sulfuric acid, and copperas.

Following plant closure, several areas containing stockpiles of copperas and unreacted ore remained at the site, as well as sedimentation and evaporation ponds. Between 1977 and 1981, six major fish kills occurred in the Piney River as a result of contamination from the site. In response to this problem, the stockpiles of copperas were removed from the surface and buried in another area at the site. Failure of the cap placed over this material and the lack of source controls at other areas of the site have resulted in continued acidic discharge into the ground water and into the Piney River. Elevated levels of metals including iron, aluminum, cadmium, chromium, nickel, and zinc have been

detected.

During the Remedial Investigation, seven areas on approximately 50 acres of the property were identified as possible sources of contamination. The remedy selected in the ROD dated November 21, 1989 addresses all known sources of contamination found in these areas. This remedy includes elimination of the buried copperas waste in Area 1 and remediation of the contaminated ground water. The major components of the selected remedy include:

- Dissolving the buried copperas waste in place and treating the generated leachate above ground (Area 1);
- Stabilizing the site by implementing drainage controls and establishing vegetative covers (Areas 2, 3, 4 and 5);
- Collecting ground water and treating it using a combination of chemical and biological (wetland) processes;
- Liming of acidified soil in areas associated with the implementation of ground water treatment (Area 7);
- Diverting surface run-off from ground water treatment areas and former sedimentation ponds (Areas 5 and 7);
- Installing 100-year flood protection around the former sedimentation ponds and ground water treatment areas (Areas 5 and 7);
- Installing security fences around waste and ground water treatment areas (Areas 1 and 7); and
- Conducting environmental monitoring to ensure the effectiveness of the remedial action.

III. Description of Significant Differences and the Basis for those Differences

The two significant differences being described in this document include:

1. Area 1: An optional method for dissolving the copperas buried at the site; and

2. Ground Water Treatment System

   A. Effluent Limitations: Changes in the effluent limitations and monitoring requirements for the discharge from the ground water treatment system into the Piney River.

B. Design and Implementation of Groundwater Collection and Treatment Systems: Clarification of the objectives of design and implementation of the ground water collection and treatment systems.

1. Area 1

In the description of alternatives presented in the ROD, five alternatives for remediation of the buried copperas (Area 1) were evaluated. One of these alternatives, Above-Grade Wet Neutralization (Alternative A1-8), was similar to the selected remedy in that it involved dissolving and treating the copperas. The primary difference was that the copperas would be excavated from the burial pits and dissolved above ground rather than being dissolved in place. In the comparative analysis of alternatives using the nine point criteria, both the In-Situ Dissolution and Treatment and the Above-Grade Wet Neutralization alternatives were identified as:

- being protective of human health and the environment by providing permanent and complete treatment of the copperas waste;
- meeting chemical, location and action specific applicable or relevant and appropriate requirements;
- providing for permanent treatment of the most contaminated waste on the site;
- reducing the toxicity, mobility, and volume of ferrous sulfate waste through treatment;
- having minimal impact to the surrounding community during implementation (Implementation of In-Situ Dissolution and Treatment and Above-Grade Wet Neutralization would require approximately 30 months and 18 months, respectively);
- utilizing reliable, demonstrated technologies; and
- meeting the strong public preference expressed at the August 9, 1989 Public Meeting for a permanent solution that removed the copperas from the site.

The reason for selecting the In-Situ Dissolution and Treatment remedy over that of Above-Grade Wet Neutralization was cost. Cost estimates in the ROD were $4.0 million for In-Situ Dissolution and Treatment and $12.5 million for Above-Grade Wet Neutralization. In preparing for the design and implementation of the remedy selected in the ROD, EPA and VDWM received data from the PRP on the cost estimates for both the In-Situ Dissolution and Treatment and the Above-Grade Wet

Neutralization alternatives. This data identified a number of inconsistencies in the original assumptions used to estimate the costs for these two alternatives. These inconsistencies resulted in an under-estimation of the cost for In-Situ Dissolution and Treatment and an over-estimation of the costs for Above-Grade Wet Neutralization. Based on the revised cost information, the costs of In-Situ Dissolution and Treatment is estimated to be $5.4 million and that of Above-Grade Wet Neutralization to be $5.5 million.

New information on the feasibility of implementing the in-situ dissolution component of the selected remedy showed several uncertainties that could add substantially to the cost. If horizonal or vertical leakage of leachate from the burial pit occurs, a slurry wall or an enhanced bottom liner could be required. In addition, channeling and collapsing of the burial pit during dissolution could reduce the ability to work on top of the area for health and safety reasons.

As a result of this new information, the In-Situ Dissolution and Treatment and the Above-Grade Wet Neutralization alternatives have been determined to offer equally effective methods of removing the buried copperas from the site when evaluated using the nine point criteria. Therefore, the option is being provided to accomplish the dissolution component of the selected remedy for the buried copperas (Area 1) either through (1) dissolution of the copperas inside the burial pit, and (2) recovery of the resulting leachate from the pit, or (1) excavation of the soil and copperas mixture from the burial pit, and (2) dissolution of the copperas from the soil. The final determination as to which of these two options will be implemented at the site will be made based on preliminary design studies.

2. Groundwater Treatment System

A. Effluent Limitations:

During preparation of the ROD, the Virginia Water Control Board (VWCB) developed effluent limitations and monitoring requirements (Appendix 1 to the ROD) for this discharge necessary to meet water quality standards in the Piney River consistent with the Clean Water Act and VWCB regulations. In preparing these requirements, VWCB made a number of assumptions consistent with the substantive requirements of the Virginia Pollution Discharge Elimination System (VPDES) permitting process normally used in establishing requirements for industrial process wastewaters. During subsequent review of these requirements, available information on actual site conditions was evaluated and the need for several modifications became evident. The necessary changes and the supporting rationale are provided below:

(i) Effluent Limitation for Total Iron

The flows used to determine the instream waste concentration and, in turn, the effluent limitations for total iron were the maximum daily discharge from the ground water treatment system and the 7Q10 low flow (i.e., lowest 7-day average flow to occur in 10 years) n the Piney River. Upon further review, the VWCB recognized that because this discharge will be ground water rather than surface water or process wastewater, its flow will be relatively constant. An increase in the rate of ground water flow would most likely occur some time after a rainfall event when the rain water has had time to percolate through the soil and into the water table. The likelihood of this increased ground water flow occurring at the same time as a 7Q10 low flow event in the Piney River is remote. Therefore, the VWCB has determined that the instream waste concentration should be calculated using the average daily discharge from the ground water treatment system and the 7Q10 low flow in the Piney River. The resulting effluent limitation for total iron based on this change is 111,381 micrograms per liter (12.2 kg/day, monthly average and 24.4 kg/day, daily maximum). This is based on an estimated average discharge from the ground water treatment system of 0.0252 million gallons per day.

(ii) Biological Monitoring

As part of the biological monitoring requirements in Appendix 1 to the ROD, acute toxicity tests are to be performed on grab samples of stormwater runoff from the site semiannually for a period of two years. This requirement was based on the assumption that stormwater from the site would continue to be contaminated. However, upon further review, VWCB recognized that with the implementation of the drainage control, stabilization, and revegetation components of the remedy, stormwater runoff would no longer come in contact with contaminated areas. Since the Toxics Management Regulation does not apply to uncontaminated stormwater discharges, VWCB has determined that this monitoring requirement is not necessary and it has been eliminated.

(iii) Chemical Monitoring

As part of the chemical monitoring requirements in Appendix 1 to the ROD, item (a.) requires the one-time sampling of the discharge from the ground water treatment system and analysis for priority pollutant and non-priority pollutant extractable and volatile organics, phenols, and cyanide. Further review of the industrial profile for the titanium dioxide sulfate process showed that none of the process waste streams were expected to contain organic

chemicals. In addition, none of the data collected as part of the remedial investigation indicates that these parameters are of concern. Therefore, the requirement for these analyses has be eliminated.

In items (b.) and (c.) of the chemical monitoring requirements, quarterly samples of the ground water treatment system discharge are to be collected for a period of one year and analyzed for a specified list of seventeen (17) metals. Upon further review, the VWCB has limited this list to eleven (11) metals. The metals removed from the list include antimony, mercury, selenium, and thallium since they were not detected in ground water or culvert discharge samples collected by VWCB during monitoring activities at the site in 1982, and cobalt and manganese since state water quality criteria do not exist for these metals.

In addition to the changes to the effluent limitations and the monitoring requirements described above, this document clarifies when and where these requirements are to take effect. In several places in Appendix 1 of the ROD, references are made to the wetlands outfall and the wetlands treatment system. The use of these terms is misleading in that the intended point of compliance for the effluent limitations and monitoring requirements is the final discharge from the ground water treatment system just prior to entering the Piney River. This point may or may not be at the discharge from the constructed wetland.

B. Design & Implementation of Ground Water Collection and Treatment System:

The selected remedy includes a passive ground water treatment system consisting of an oxidation/sedimentation pond, a constructed wetland, and a limestone neutralization bed. This system shall be designed to be capable of collecting and treating the full capacity flow and concentration of ground water in the minimum amount of time practicable. It is recognized that the constructed wetland component of the passive ground water treatment system may take 2-3 years to be fully operational. In order to acclimatize the constructed wetlands, the design and construction of the wetlands may be initiated earlier than the design and construction of the oxidation/sedimentation pond and the limestone neutralization bed, provided that the design and construction of these two components is not delayed. The existing surface runoff may be routed through the constructed wetlands to achieve acclimatization of the wetlands.

The Remedial Design Work Plan shall delineate specific criteria to be used as the basis for the design of the proposed passive system. If, during the remedial design

phase, it is demonstrated, based on newly-discovered conditions or new information, that the passive system will not be capable of treating the expected full capacity flow and concentration of the ground water within the required time schedule as specified below, the design of auxiliary treatment units will be required as necessary.

Collection of some portion of site ground water via the ground water collection system will commence as soon as the ground water treatment system has sufficient capability to treat the ground water without violating the effluent limitations. The wetlands component may be utilized incrementally as it gradually attains its full design capacity. All ground water collected will be treated in the ground water treatment system.

The ground water collection system may be installed in phases. However, within three years of the date of the start of the first Spring growing season for the wetlands as approved in the Remedial Design Work Plan, the ground water collection and treatment system will be in place and capable of treating the full capacity flow and concentration of ground water. The amount of ground water collected prior to the end of this three year period will be the maximum amount which the passive system is sufficiently capable of treating without violating the effluent limitations. By the end of this three year period, it will be determined whether the ground water treatment system needs to be supplemented and/or modified as necessary to treat the full capacity flow and concentration of the ground water without violating the effluent limitations. If the determination is made to supplement or modify the system, the system as supplemented or modified must be capable of treating the full capacity flow and concentration of the ground water within one year of such a determination. The effluent limitations and monitoring requirements applicable to the discharge from the ground water treatment system, as identified in Appendix 1 of the ROD and modified in this ESD, will become effective at the time when ground water from the collection system first enters the ground water treatment system and discharges to the Piney River.

If, at any time during the design and operation of the passive treatment system, it is demonstrated, based on newly-discovered conditions or new information, that the system will not be capable of treating the full capacity flow and concentration of the ground water within three years of the date of the start of the first Spring growing season for the wetlands as approved in the Remedial Design Work Plan, design and installation of any necessary auxiliary treatment units should commence at the earliest possible date.

The Remedial Design Work Plan will address implementation of any necessary action to be taken upon a determination at any time during the remedial action that the ground water treatment system is failing to meet the effluent discharge limits. In no event will the effluent limits for total iron and pH be violated upon the introduction of the collected ground water in the ground water treatment system.

IV. Support Agency Comments

As stated in the Introduction to this ESD, the Virginia Department of Waste Management was the Lead Agency for RI/FS activities. VDWM has been involved in the evaluation of all the information relating to the changes discussed in this ESD and fully supports these recommendations.

V. Affirmation of the Statutory Determinations

Considering the new information that has been developed and the changes that have been made to the selected remedy, the Environmental Protection Agency and the Virginia Department of Waste Management believe that the remedy remains protective of human health and the environment, complies with Federal and State requirements that are applicable or relevant and appropriate to this remedial action, and is cost-effective. In addition, the revised remedy continues to utilize permanent solutions and alternative treatment technologies to the maximum extent practicable for this site.

VI. Public Participation Activities

This document is part of the administrative record for the site and thus available for public review at the times and places provided earlier in this document. This document will also be included as an attachment to any Consent Decree negotiated for the Remedial Design and Remedial Action at this site. Consent Decrees are available for public comment, pursuant to § 122 (d)(2) of CERCLA, 42 U.S.C. § 9622(d)(2), and 28 C.F.R. § 50, upon being lodged in Federal Court.

VII. Signatures

UNITED STATES ENVIRONMENTAL
PROTECTION AGENCY

9/26/90
Date

Regional Administrator

VIRGINIA DEPARTMENT OF
WASTE MANAGEMENT

9/20/90
Date

Director